

# Dilip Kumar Swain

Associate Professor

Sperm Signaling Laboratory

Department of Veterinary Physiology

College of Veterinary Science & Animal Husbandry, U.P. Pandit Deendayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan, Mathura - 281001, Uttar Pradesh, India

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## HOME ADDRESS:

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## RESEARCH LINKS:

<https://orcid.org/0000-0002-4391-334X>

[https://www.researchgate.net/profile/Dilip-Swain?ev=hdr\\_xprf](https://www.researchgate.net/profile/Dilip-Swain?ev=hdr_xprf)

<https://scholar.google.co.in/citations?user=v3en18YAAAAJ&hl=en>

<https://pubmed.ncbi.nlm.nih.gov/?term=dilip+kumar+swain>

## PASSPORT DETAILS:

Issued by Republic of India, Passport No: Z3467715

## EDUCATION

Degree	Institute
Post-Doctoral Training (2023-2025)	Department of Cell Biology & Physiology, School of Medicine, Washington University at St Louis <b>Mentor:</b> Polina V. Lishko, BJC Investigator, Professor, Cell Biology and Physiology <b>Research and Training:</b> Whole Cell Sperm Patch Clamp/ Electrophysiology and CatSper biology, thermal sensing of spermatozoa, Temperature-gating of CatSper
Ph.D (2014) OGPA: 8.01	Lactation Physiology Laboratory, Division of Dairy Cattle Physiology, ICAR-National Dairy Research Institute (ICAR-NDRI), Karnal, Haryana, India-132001 <b>Mentor:</b> Dr. Ajay Kumar Dang, Principal Scientist, DCP <b>Thesis Research: Surface receptors and apoptosis of neutrophils as markers of mammary health in cows</b>
MVSc (2007) OGPA: 9.01 (Gold Medal)	Department of Veterinary Physiology, College of Veterinary Science and AH, Odisha University of Agriculture and Technology (OUAT), Odisha- Bhubaneswar

	<b>Mentor: Dr. Akhya Kumar Kundu</b> <b>Thesis Research: Effect of different antioxidants on cryopreservation of bull semen</b>
BVSc & AH (2004) OGPA: 7.61 (H)	College of Veterinary Science and AH, Odisha University of Agriculture and Technology (OUAT), Odisa- Bhubaneswar

## AREA OF SPECIALISATION

- Immunophysiology
- Sperm Ion channels
- Sperm Patch Clamp
- CatSper biology
- Immunology of Sperm function
- Seminal exosomes
- Skewing sex ratio

## WORK EXPERIENCE/TEACHING EXPERIENCE

- **July 2022- Till Date:** Associate Professor, Department of Veterinary Physiology, COVSc & AH, DUVASU, Mathura: Teaching Physiology to postgraduate and undergraduate students, research, and extension.
- **January 2023-January 2025:** Post-Doctoral Research Associate, Lishko Lab, Washington University at St Louis, USA.: Research in the area of sperm ion channels, CatSper, thermal sensing, and Sperm Patch Clamp.
- **July 2009- July 2022:** Assistant Professor, Department of Veterinary Physiology, COVSc & AH, DUVASU, Mathura: Teaching Physiology to postgraduate and undergraduate students, research, and extension.
- **2008 Jan- July 2008:** Research fellow at All India Institute of Medical Science (AIIMS), New Delhi.
- **2006-2008:** Head of the Faculty (Department of Zoology), Kalinga Bharati Residential College, Cuttack, Odisha.

## RESEARCH EXPERIENCE

- **August, 2004- May, 2005-** Evaluation of canine epididymal spermatozoa longevity *in vitro*.

**Supervisor:** Dr. A.K. Kundu, Professor and Head; College of Veterinary Science and AH, Odisha University of Agriculture and Technology (OUAT), Odisha- Bhubaneswar.

- **July, 2005 – January, 2007:** Effect of antioxidant supplementation on cryopreserved bull semen.

**Supervisor:** Dr. A.K. Kundu, Professor and Head, College of Veterinary Science and AH, Odisha University of Agriculture and Technology (OUAT), Odisha- Bhubaneswar.

- **Feb –April 2008:** Autonomic regulation of cardiovascular functions.

**Supervisor:** Dr. K. K. Deepak, Autonomic Function Laboratory, AIIMS, New Delhi.

- **May – July 2008:** Spinal cord injury and transplantation of bone marrow stem cells.

**Supervisor:**Dr. Rasmi Mathur, Pain Neurophysiology Laboratory, AIIMS, New Delhi.

- **Jan – June, 2009:** Enzyme immune assays for the estimation of hormones in domestic animals.

**Supervisor:** Dr. B.S. Prakash, Head and Principal Scientist, NDRI, Karnal.

- **April 2012- October, 2013:** Immunophysiology, Lactation Physiology, molecular basis of sub-clinical and clinical mastitis

**Supervisor:** Dr. Ajay Kumar Dang, Principal Scientist, NDRI, Karnal.

- **April 2014- December 2022:** Ion channels in the regulation of spermatozoa function, hormone signaling in spermatozoa, and extracellular vesicles in the regulation of spermatozoa function.
- **January 2023-January 2025:** Sperm patch clamp, electrophysiology of thermal sensing channels in sperm cells, CatSper gating, ion channel biology.
- **January 2025- Till Date:** Ion Channel biology and Polyamine Physiology

#### **Working as an independent researcher**

- **Total Research experience:** 15 years
- **Research experience after Ph.D:** 12 years

#### **TEACHING**

Professional teaching to undergraduate, graduate and doctoral students for **15 years**.

## **TRAINING ATTENDED**

- **February- 2010:** “Recent Advances in Stem cell science”- 21 days at Center for Advanced Faculty Training in Physiology at IVRI, Izzatnagar, Bareilly, Indian Veterinary Research Institute (IVRI), Barelley, India.
- **March- 2011:** “Recent techniques in Proteome analysis”- 21 days at Proteomics Laboratory, Animal Biotechnology division, NDRI, Karnal, India.
- **January 2023-January 2025:** Sperm patch clamp, electrophysiology of thermal sensing channels in sperm cells, CatSper gating, ion channel biology.

## **ACADEMIC DISTINCTION**

- **2019-20:** Best Teacher Award
- **2013-14:** Academic excellence Award during Ph.D
- **2008-09:** ICAR- SRF for PhD
- **2008- 09:** Student Representative, Departmental Advisory Committee.
- **2004- 07:** University Merit Scholarship for post graduation
- **1998-2004:** University Merit Scholarship throughout the undergraduate career in OUAT, Bhubaneswar, India.
- **1991-95:** National Rural Talent Search Scholarship, Dept. of School and Mass Education; Govt. of Orissa, India.

## **PROFESSIONAL MEMBERSHIP, AWARDS, FELLOWSHIP RECEIVED**

- Registered Veterinary Practitioner in the State of Orissa (Regd. No. 2201), India.
- Lifetime member of Veterinary Council of India (VCI)
- Lifetime member of the Society of Animal Physiologists of India (SAPI).
- Lifetime member of the Animal Physiologists Association (APA)
- Annual Member of American Society of Andrology (ASA)
- Annual Member of Society for Study of Reproduction (SSR)
- Lifetime member of the Society for Conservation of Biodiversity of India (SODCAB)

- Lifetime member of the Society for the Study of Animal Reproduction (ISSAR)
- Lifetime member of the Indian Society for the Study of Reproduction and Fertility (ISSRF)
- Received ICAR- SRF for continuing PhD
- Best young teacher award by Asha Memorial Trust, Orissa
- Gold Medallist in MVSc by standing first class with first with Honours and distinction.
- Best Research Paper Awards: 05
- Best Poster Awards: 05

### AWARDS

Sl.No	Name of the Award	Agency	Year
1	Best Poster award- Dr. J.N. Pandey Memorial Best Poster Award	SAPI- India (National Society): XXVIII Annual Conference & National Symposium on “Physiological approaches to address environmental challenges for increasing animal productivity and farmer's income” in association with ICAR-CSWRI, Avikanagar at ICAR-Central Sheep and Wool Research Institute, Avikanagar-304501 from 18-19 Feb 2020.	<b>2020</b>
2	Best Orator Award	SAPI India (2021), BASU Patna	<b>2021</b>
3	Best Poster award- Dr. J.N. Pandey Memorial Best Poster Award	SAPI India (National Society) XXX Annual Conference and National Symposium on- “Shifting basic physiological paradigm towards clinico-therapeutic innovative interventions for improvement in livestock health and production (SAPICON 2022 NAGPUR)	<b>2022</b>

4	Best Paper Award-02	SVVBI India (National Society): V <sup>th</sup> Annual Convention of Society of Veterinary Biochemists and Biotechnologists of India (SVBBI) and National Symposium on “Current Challenges for Animal Biochemists and Biotechnologists for Improving Animal Health and Production in Post COVID Scenario”.	<b>2022</b>
5	Prof. S.S. Guraya Young Scientist Award	Indian Society for the Study of Reproduction and Fertility (ISSRF-India) (National Society).  33 <sup>rd</sup> Annual Meeting of the Indian Society for the study of Reproduction and Fertility (ISSRF-2023)	<b>2023</b>
6	Dr. D.N. Mullick Mid Career Award- 2023	Society of Animal Physiologists of India (SAPI India)	<b>2023</b>
7	APA Mid Carrer Award-2022	National Seminar cum Annual convention of Animal Physiologists Association (APA) on-” Advanced Physiological Strategies for sustainable livestock production and Reproduction” ICAR-CSWRI, Avikanagar, Rajasthan (APACON 2024 (ICAR-CSWRI)	<b>01-02, March 2024</b>
8	APA Best Research Paper Award-2022	National Seminar cum Annual Convention of Animal Physiologists Association (APA) on-” Advanced Physiological Strategies for sustainable livestock production and Reproduction” ICAR-CSWRI, Avikanagar, Rajasthan (APACON 2024 (ICAR-CSWRI)	<b>01-02, March 2024</b>
9	Prof. S.S. Guraya Memorial Oration Award	Indian Society for the Study of Reproduction and Fertility (ISSRF-	<b>2025</b>

		India) (National Society): 35 <sup>th</sup> Annual Meeting of the Indian Society for the study of Reproduction and Fertility (ISSRF-2025)	
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## EXTRACURRICULAR ACTIVITIES

- University Gold medal in MVSc physiology
- Best Young Teacher award
- Pride of Orissa award by Asha Memorial Trust
- Represented the University & College in the state cricket championship.
- Represented school & college in state level debate & essay competition.
- Won the best debater award in The All-India Cultural Programme, Reverie, 2009.

## RESEARCH PROJECTS COMPLETED

### A. University-funded Projects

S. No.	Title of the project	PI or Co-PI	Funding source	Budget in Lacs
1	Molecular basis of host immune response in mastitic dairy cows of different production potential, parity, and lactation and identification of suitable markers for early diagnosis of subclinical mastitis and development of therapeutics for mastitis (2014-15).	PI	University	2.46
2	Modulation of host innate and adaptive immune system affecting production in Sahiwal and Haryana cattle in the changing climate scenario (2014-15).	Co-PI	University	2.97
3	Deciphering the thermal stress associated deprotonation and DNA compaction in Bull Sperm (2015-16)	PI	University	2.00
4	Assessment of apoptosis and capacitation-like changes in the cryopreserved sperm of cattle and buffalo (2015-16).	Co-PI	University	1.00

5	Mechanistic insights into melatonin signaling in bull spermatozoa and understanding its role in the regulation of sperm capacitation and acrosome reaction (2021-22)	PI	University	2.00
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### B. Externally funded project

S. No.	Title of the project with duration	PI or Co-PI	Funding source	Budget in Lacs
1	Mechanistic insights into the signal transduction pathways of Progesterone in regulating functional dynamics in bovine and caprine spermatozoa-[BT/PR27446/AAQ/1/717/2018]- <b>2018-2021</b>	PI	Department of Biotechnology, Govt. of India	86.17
2	AICRP on “Nutritional and Physiological approaches for enhancing reproductive performance in cattle and buffaloes”- <b>2017-Continuing</b>	Co-PI	ICAR-New Delhi	5.67

### C. Chairman Student Advisory Committee/Thesis Guide:

- Number of PG students guided: 04
- Member of Advisory Committee (Ph.D): 05
- Member of Advisory Committee (MVSc): 40

### D. Technical Articles/ Review Article/Popular Article/ Book Chapter:

- Technical Articles: 05
- Review Article: 04 (International)
- Popular Article: 03
- Book Chapter: 05
- Number of International Research Publications: 60
- Number of National Research Publications: 35

### E. Book Published/ Authored/ Edited individually or jointly/ Manuals/ Teaching Aids

- Book published: 00
- Manuals: 06



- Teaching Aids: 02
- F. Number of extension lectures delivered: **25**
- G. Number of lectures invited in conferences, workshops, symposia, winter school, summer school, and seminars: **45**
- H. Number of guest lectures in other universities: **08**
- I. Number of lead papers in conferences: **12**

## PUBLICATIONS

### 2025

- Yadav B, Srivastava A, Yadav P, **Swain DK**, Anand M, Yadav S, Madan AK. Identification of Thermoneutral Zone in Sahiwal Zebu Calves in Subtropical Climate of India. *Animals*. 2025; 15(13):1830.
- **Swain DK**, Vergara C, Castro-Arnau J, and Lishko PV (2025). The essential calcium channel of sperm CatSper is temperature-gated. *Nature Communications*, **16**: 3657-3671.
- Sachan V, Saxena A, Kumar A, Sharma P, Agrawal JK, and **Swain DK** (2025). Nongenomic Progesterone Receptors Mediated Bull Sperm Capacitation and Acrosome Reaction Are cAMP-PKA-Calcium Channel Dependent. *Reproduction in Domestic Animals*, 2025; 60:e70045.
- Yadav BK , Agrawal JK , Gangwar K , **Swain DK** , Yadav B , Kumar A , Sachan V , Anand M , Kumar B , Saxena A (2025) . Effect of carnitine on Haryana bull spermatozoa function after cryopreservation. *Cryo Letters*, 46(1):31-40.
- Ranjan R , Kumar M, **Swain DK** , Singh SP , Kharche SD , Singh MK , Chauhan MS . (2025). Iodixanol fortification in freezing extender protects sperm DNA damage and improves antioxidant capacity. *Cryo Letters*, 46(3):207-212.

### 2024

- Yadav RS, Kushawaha B, Dhariya R, Swain DK, Yadav B, Anand M, Kumari P, Rai PK, Singh D, Yadav S, Garg SK (2024). Lead and calcium crosstalk tempted acrosome damage and hyperpolarization of spermatozoa: signaling and ultra-structural evidence. *Biol Res*. 5;57(1):44.
- Yadav HP , Mohanty TK , Dewry RK , Lone SA , Nath S , Bhakat M , Baithalu RK , Tiwari S , **Swain DK** , Kumar P , Mohanty AK , Datta TK (2024) . Reduced sperm

number of murreh (*Bubalus bubalis*) bull semen in French mini-straw affects kinetic and functional competence after cryopreservation. *Cryo Letters*. 45(1):36-40.

- Sachan V, Choudhury S, **Swain DK**, Kumar A, Saxena A, Sharma P, Singh AK (2024). Characterization of membrane-associated non-genomic progesterone receptors in cattle bull spermatozoa. *The Indian Journal of Animal Sciences*, 94(12), 1096–1099.
- Singh AK, Saxena A, **Swain DK**, Yadav B, Kumar A, Sachan V, Agrawal JK (2024). Cryoprotective Assessment of Lycopene in Tris-based Extender on Freezability of Bull Semen. *Indian Journal of Animal Research*. 1-6. doi: 10.18805/IJAR.B-5413.

## 2023

- Kumar G, Yadav DK, Saxena A, Sachan V, Kumar, A, **Swain DK**, Yadav B (2023). Effect of Trehalose on Cryopreservation of Haryana Bull Spermatozoa. *Ind J Vet Sci and Biotech*. 19(6), 1-4.
- Ravi R, Sharma K, Kumar M, **Swain DK**, Singh SP, Kharche SD, Singh MK and Chauhan MS (2023). IGF-1 stabilizes goat sperm mitochondrial transmembrane potential and reduces DNA fragmentation. *CryoLetters* 44(6), 327-332.
- Sethi M, Shah N, Bagri HK, Bhakat M, **Swain DK** and Mohanty TK (2023). The role of kisspeptin neuropeptide in controlling reproduction. Review. *Indian J Anim Health*, 62(2): 244-251
- Quadri SA, Singh SP, Kharchee SD, Pathak J, Saxena A, Soni YK, **Swain DK** (2023). Different effects of sugars and methods to preserve post-thaw functional properties of cryopreserved caprine spermatogonial stem cells. *Cells Tissues Organs*, 1-17 (DOI: 10.1159/000529482).
- Yadav DK, Kumar A, Gupta S, Sharma P, Kumar G, Sachan V, Yadav B, Yadav S, Saxena A, Swain DK (2023). Antioxidant additive melatonin in tris-based egg yolk extender improves post-thaw sperm attributes in *Haryana Bull*. *Animal Reproduction Science* 251: 107214 (doi: 10.1016/j.anireprosci.2023.107214).

## 2022

- **Swain DK**, Sharma P, Shah N, Sethi M, Mahajan A, Gupta SK, Mishra AK, Yadav S (2022). Introduction to the pathways involved in the activation and regulation of sperm motility: A review of the relevance of ion channels. *Animal Reproduction Science* *Animal Reproduction Science*, 246: 107052-107062
- Mahajan A, Sharma P, Mishra AK, Gupta S, Yadav S, Anand M, Yadav B, Madan AK and **Swain DK** (2022). Interplay mechanisms between progesterone and endocannabinoid receptors in regulating bull sperm capacitation and acrosome reaction. *Journal of Cellular Physiology*, 237:2888–2912 (DOI: 10.1002/jcp.30753).
- Sethi M, Mohanty TK, Bhakat M, Shah N, Yadav DK, Baithalu RK, **Swain DK** (2022). Trehalose with a modified freezing protocol can be an alternative to improve the sperm motility of poor freezable dairy bulls. *The Pharma Innovation Journal* SP-11 (8): 766-769
- Yadav B, Yadav S, Madan AK, Anand M, **Swain DK**, Pandey V and Sirohi R (2022). Heat Stress responses to increasing temperature humidity index (THI) in lactating Murrah Buffalo. *Buffalo Bulletin*, 41(1), pp.161-170.
- Kumar M, Kumar A, Sachan V, Agrawal J, Saxena A, Singh AK, Gupta SK, and Swain DK (2022) Effect of Resveratrol supplementation on the semen quality of cryopreserved *Haryana* bull semen. *Ruminant Science* 11 (2): 475-478.
- Ranjan R, Kumar M, **Swain DK**, Singh SP, Kharche SD and Chauhan MS (2022). Vitamin B7 protects DNA damage and stabilizes mitochondrial transmembrane potential from cryoinjury. *Small Ruminant Research*. 212: 106719-106724.
- Kumar G, Saxena A, Yadav DK, Scahan V, Agrawal J and **Swain DK** (2022). Trehalose supplementation improves membrane integrity and reduces cryocapacitation like changes in cryopreserved *Haryana* bull semen. *Journal of Experimental Zoology, India*. 25 (1): 1169-1172.

## 2021

- Singh AK, Saxena A, **Swain DK**, Sachan V, Agrawal J, Kumar A (2021). Assessment of seminal attributes of neat Haryana Bull Semen. *The Pharma Innovation Journal*. SP- 10 (12): 9-14
- Gupta S, Kumar A, Mahajan A, Sharma P, Sachan V, Aggrawal J, Yadav S, Saxena A and **Swain DK** (2021). Curcumin in a tris-based semen extender improves cryosurvival of Haryana bull spermatozoa. *Andrologia*: DOI: 10.1111/and.14255
- Kushawaha B, Yadav RKS, **Swain DK**, Kumari P, Kumar A, Yadav B, Anand M, Yadav S, Singh D, Garg SK (2021). Collapsed mitochondrial cristae in goat spermatozoa due to mercury result in lethality and compromised motility along with altered kinematic patterns. *Scientific Reports*. 11:646-663.
- Yadav P, Yadav B, **Swain DK**, Anand M, Yadav S and Madan AK (2021). Differential expression of miRNAs and related mRNAs during heat stress in buffalo heifers. *Journal of Thermal Biology*, p.102904.
- Sharma GT, Chandra V, Mankuzhy, Thirupathi Y, **Swain DK**, Pillai H, Patel SK, Pathak M, and Guttula S (2021). Physiological implications of COVID-19 in reproduction: angiotensin-converting enzyme 2 a key player. *Reproduction, Fertility and Development*, 33:381–391.

## 2020

- Kritaniya D, Yadav S, **Swain DK**, Reddy AV, Dhariya R, Yadav B, Anand M and Nigam R (2020). Freezing-thawing induces deprotamination, cryocapacitation-associated changes; DNA fragmentation; and reduced progesterone sensitivity in buck spermatozoa. *Animal Reproduction Science*, 223, p.106628.
- Saraswat S, Kharche SD, Rout PK, Pawaiya R, Gangwar C, **Swain DK**, Kaushik R (2020). Molecular expression and identification of caprine estrogen receptor gene 1 for fertility status in bucks. *Reproduction in Domestic Animal*, 55:1080–1092.
- Kushwaha B, Yadav RK, **Swain DK**, Rai PK, Garg SK (2020). Mercury- induced inhibition of tyrosine phosphorylation of sperm proteins and altered functional dynamics of buck spermatozoa: an in vitro study. *Biological Trace Element Research*. doi: 10.1007/s12011-020-02077.

- Kumar A, Yadav B, **Swain DK**, Anand A, Madan AK, Yadav RK, Kushwaha B, Yadav S (2020). Dynamics of HSPA1A and redox status in the spermatozoa and fluid from different segments of goat epididymis. *Cell Stress and Chaperones*. doi: 10.1007/s12192-020-01102-3.
- Mahajan A, Sharma P, Yadav S, **Swain DK**. (2020). Endocannabinoid signaling in spermatozoa: A mini review. *Journal of Animal Research*. 10 (2): 163-171.

## 2019

- Kumar A, Mishra AK, Singh V, Yadav S, Saxena A, Garg SK, **Swain DK** (2019) Molecular and functional insights in to Transient Receptor Potential Vanilloid 1 (TRPV1) in bull spermatozoa. *Theriogenology*, 128: 207-217.
- Mishra AK, Kumar A, Yadav S, Anand M, Yadav B, Nigam R, Garg SK, **Swain DK** (2019). Functional insights into voltage gated proton channel (Hv1) in bull spermatozoa. *Theriogenology*, 36: 118-130.
- Singh SP, Ramachandran N, Sharma N, Goel AK, de Sousab NM, Beckers JF, **Swain DK**, Singh MK, Kharche S.D. (2019). Relationship of foetal number and parity in Barbari goats to plasma profile of caprine pregnancy-associated glycoprotein (caPAG) during gestation and the early postpartum period. *Animal Reproduction Science*. 210: 106190-106201.

## 2018

- Chauhan DS, **Swain DK**, Shah N, Yadav HP, Sharma A, Yadav B, Nigam R, Yadav S, Garg SK (2018). Modulation of voltage-gated sodium channels induces capacitation in bull spermatozoa through phosphorylation of tyrosine containing proteins. *Theriogenology*. 108: 207-216.
- Gupta RK, **Swain DK**, Singh V, Anad M, Choudhury S, Yadav S, Saxena A, Garg SK (2018). Molecular characterization of voltage-gated potassium channel (Kv) and its importance in functional dynamics in bull spermatozoa. *Theriogenology*. 114:229-236.
- Mishra A, Kumar A, Nigam R, Yadav S, **Swain DK** (2018). Insights into pH regulatory mechanisms mediating spermatozoa functions. Review. *Veterinary World*. 11(6): 852-858.
- Reddy V, Yadav B, Yadav CL, Anand M, **Swain DK**, Kumar D, Kritania D, Madan AK, Kumar J, Yadav S (2018). Effect of sericin supplementation on heat shock protein

70 (HSP70) expression, redox status and post thaw semen quality in goat. *Cryobiology* 84 (2018) 33–39.

- Kumar A, Mishra AK, **Swain DK**, Singh V, Yadav S, Saxena A (2018) Role of Transient Receptor Potential (TRP) channels in regulating spermatozoa functions: A Mini Review. *Veterinary World*, 11(11): 1618-1623.
- Yadav HP, Kumar A, Shah N, Chauhan DS, Lone SA, Swain DK, Saxena A (2018). Effect of cholesterol-loaded cyclodextrin on membrane and acrosome status of *Haryana* bull sperm during cryopreservation. *CryoLetters*, 39 (6):386-390.

## 2017

- Chauhan DS, Swain DK, Shah N, Yadav HP, Nakade UP, Singh VK, Nigam R, Yadav S, Garg SK (2017). Functional and molecular characterization of voltage-gated sodium channel Na<sub>v</sub> 1.8 in bull spermatozoa. *Theriogenology*. 90:210-218.
- Swain DK, Yadav S, Singh SK (2017). Effect of four different in vitro incubation temperatures on functional dynamics, process of capacitation and apoptosis in goat spermatozoa. *Small Ruminant Research*. 147:120–124.
- Anand M, Yadav S, Kumar J, Yadav B, Swain DK (2017). Effect of different levels of turkey egg yolk on physical attributes of Barbari buck semen. *Indian Journal of Small Ruminants*. 23 (2): 190-193.

## 2016

- **Swain DK**, Yadav S, Pandey V (2016). Seasonal variations of cauda epididymal spermatozoa of bucks. *Journal of Advanced Veterinary and Animal Research*. 3(3):263-267.
- **Swain DK**, Kushwah MS, Kaur M, Mohanty AK, Dang A (2016). Surface expression of CD11b, CD62L, CD44 receptors on blood and milk neutrophils during subclinical and clinical mastitis in Sahiwal cows. *Indian Journal of Animal Sciences*. 86 (3): 250–255.
- **Swain DK**, Kushwah MS, Dang AK (2016). Neutrophil surface adhesion molecule and toll like receptor dynamics in crossbred cows suffering from *Staphylococcus aureus* subclinical and clinical mastitis. *Journal of Advanced Veterinary and Animal Research*, 3(2): 99-105.

- Singh SK, Singh VK, Yadav BK, Nakade UP, Kumari P, Srivastava MK, Sharma A, Choudhary S, **Swain DK**, Garg SK (2016). Potential association of reduced cholinesterase activity with *Trypanosoma evansi* pathogenesis in buffaloes. *Veterinary Parasitology*. 225: 29–32.
- **Swain DK**, Kumar J, Yadav S, Singh SK, Singh Y, Dang AK (2016). The functional dynamics of neutrophils during different seasons in zebu cattle. *Biological Rhythm Research*, DOI:10.1080/09291016.2016.1251937.
- Mandil R, Rahal A, Prakash A, Garg SK, Gangwar NK, **Swain DK** (2016). Ameliorative potential of  $\alpha$ -tocopherol against flubendiamide and copper-induced testicular-insult in Wistar rats. *Chemico-Biological Interactions*. 260: 91-101.
- Dixit A, Pandey V, **Swain DK**, Nigam R, Sharma A, Sharma D, Saxena A, Singh P (2016). Seminal plasma and sperm membrane proteins of buffalo and cattle bulls: a comparative study. *Buffalo Bulletin*. 35(3): 291-297.

## 2015

- Sharma L, Pandey V, Nigam R, Saxena A, **Swain DK** (2015). Association of Semen Attributes and Seminal Plasma Proteins of Buffalo Bulls. *Journal of Animal Research*. 5(1): 119-123.
- **Swain DK**, Kushwah MS, Kaur M, Dang A (2015). Elucidation of Molecular Basis of Neutrophil Apoptosis during *Staphylococcal Mastitis* in Crossbred Cows. *Journal of Animal Research*. 5(1): 53-59.
- **Swain DK**, Kushwah MS, Kaur M, Dang AK (2015). Neutrophil dynamics in the blood and milk of crossbred cows naturally infected with *Staphylococcus aureus*, *Veterinary World* 8(3):336-345.
- Patel A, Saxena A, **Swain DK**, Yadav D, Yadav SS, Kumar A, Kumar A (2015) Effect of supplementation of butylated hydroxytoluene on post-thaw sperm viability, motility and membrane integrity of Haryana bulls, *Veterinary World* 8(6): 808-812.

- **Swain DK**, Kushwah MS, Kaur MDang A (2015). Immunolocalization of surface adhesion receptors on neutrophils isolated from Karan Fries Cows. *Ruminant Science* 4 (1): 95-98.

## 2014

- Pandey V, Nigam R, Singh P, Sharma A, Saxena A, **Swain DK**, Sharma L, Dixit S (2014). Influence of season on biochemical attributes of bhadawari buffalo bull semen: effect of temperature and humidity. *Journal of Animal Research*. 4 (2): 201-209.
- **Swain DK**, Kushwah MS, Kaur M, Patbandha TK, Mohanty AK, Dang AK (2014). Formation of NET, phagocytic activity, surface architecture, apoptosis and expression of toll like receptors 2 and 4 (TLR2 and TLR4) in neutrophils of mastitic cows. *Veterinary Research Communication*. 38:209–219
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